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ABSTRACT

This unit of instruction was designed as a laboratory study of soils, plants, crop improvements and pesticides, and gives consideration to fish farming, tropical fish, and careers in agriculture. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, discussion questions and reports. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other course materials are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

AGRICULTURAL BIOLOGY

5314.09

SCIENCE

(Experimental)

SE 010 510

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

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AGRICULTURAL BIOLOGY

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SCIENCE

(Experimental)

Written by Fred D. Basnett
for the
DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1972

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AGRICULTURAL BIOLOGY

COURSE DESCRIPTION

Laboratory study of soils, plants, crop improvements, and pesticides. Fish farming, tropical fish and careers in agriculture are included.

Rationale

Agriculture is a most important facet of our daily life. Food science and productivity increases are becoming more and more significant for our survival now and in the future. There are many areas of influence in the school and out that are available for the student who wishes to pursue a career in agriculture or simply to become more informed in the science. Soil science, meterology, crop raising, pesticides, horticulture, food distribution, migrant labor, world supply and demand are only some of the important areas to consider. A greater understanding of some of the methods used in agriculture and the increasing awareness of the population problems may assist the student to make some contribution to our society through agriculture.

ENROLLMENT GUIDELINES

This course is designed for the terminal student either as a part of the basic biology requirement or as an interest course. The slow reader should be encouraged to take this course.

STATE ADOPTED TEXTS

The nature of the course is orientated toward involvement through experimentation and practical experiences. There is no state adopted text available.

The following books contain many relevant areas for study:

1. Biological Sciences Curriculum Study. Biological Science: An Inquiry Into Life. 2nd ed. New York: Harcourt, Brace and World, 1968.

STATE ADOPTED TEXTS (Continued)

2. Biological Sciences Curriculum Study. Biological Science: Molecules to Man. 2nd ed. Boston: Houghton Mifflin Company, 1968.

3. Biological Sciences Curriculum Study. High School Biology. 2nd ed. Chicago: Rand McNally and Company, 1968.

4. Brandwein, et al. The Earth: It's Living Things. New York: Harcourt, Brace, Javanovich, Inc., 1970.

PERFORMANCE OBJECTIVES

1. Given three different soil samples, the student will describe two different characteristics of each.

2. The student, given a soil sample will analyze this sample for a pH reading to within one unit of measurement.

3. The student will discuss coordinates on a graph plotted from results of collected data of rainfall for a four week period.

4. Given the seal of chemical concentrations from a bag of fertilizer, the student will describe the characteristics of the soil to which this particular fertilizer should be added.

5. The student will collect data from the measurement of at least two types of seeds germinating in a germination plate, and prepare a graph showing growth rates.

6. Given three different examples of basic flower types, the student will predict the type and appearance of the seeds that will be produced.

7. Given mixed examples of fruit and vegetables, the student will catagorize these according to fruit, vegetable root, stem or seed mass.

8. Given the necessary materials, the student will perform at least two grafting and budding operations on selected plants.

9. The student will, after collecting several different types of insects, separate them into groups according to their basic wing structure.

PERFORMANCE OBJECTIVES (Continued)

10. Given several examples of agricultural pests, the student will describe the economic problems related to their control.

11. Having visited a local nursery or school agricultural farm, the student will cite selected methods involved in the growing and marketing of landscape plants.

12. Given several major agricultural crops, the student will discuss their economic value in terms of labor problems, machinery needed, shipping procedures and disease problems.

COURSE OUTLINE

I. Soil Types and Agricultural Importance

A. Distribution

B. Characteristics

1. Horizons

2. Structure and size

3. Porosity and leeching

4. Zones of accumulation

C. Limiting factors

1. Chemistry

a. pH
b. Nitrogen
c. Potassium
d. Potash
e. Trace elements

2. Environmental considerations

a. Temperature
b. Rainfall
c. Salt intrusion
d. Fire
e. Irrigation
f. Pesticides residuals
g. Decomposition

COURSE OUTLINE (Continued)

II. Economically Important Crops and Livestock

A. Citrus

1. Commercial importance

2. Home grown and use

B. Vegetables

1. Commercial importance

2. Home gardening

C. Timber

1. Forest products

2. Farm and home stocking

3. Seedling availability and distribution

D. Nursery Stock

1. Landscaping

2. Growing techniques

a. Grafting
b. Budding
c. Air layering
d. Vegetative propagation

E. Livestock

1. Types

2. Commercial importance

3. Car

III. Pests

A. Plant

1. Rusts

2. Smuts

3. Wilts

COURSE OUTLINE (Continued)

4. Molds

5. Programs of eradication

a. Quarantine
b. Competition
c. Removing intermediate hosts
d. Field techniques

B Animal

1. Insects

a. Economic importance
b. Pesticides and pollution
c. Life cycles
d. Identification
e. Eradication programs

2. Nematodes

a. Economic importance
b. Identification
c. Eradication techniques

IV. General Agriculture

A. Department of Agriculture

1. Extension services

2. Fish and wildlife service

a. Farm ponds
b. Fish farming
c. Wildlife management

3. Seedling distribution programs

B. Educational agriculture and vocations

1. Extension services

2. County agent program

3. School agricultural farms

COURSE OUTLINE (Continued)

a. Garden clubs
b. 4-H clubs
c. FFA organizations

4. Conservation organizations

a. Sportmen's clubs
b. Audubon society
c. Bird sanctuary programs
d. Izaac Walton league

C. Legislation and budget

1. Farm representation in legislature

2. Marketing techniques

EXPERIMENTS

BSCS Green Version Laboratory Manual. Chicago: Rand McNally and Co., 1964.

1. Diversity Among Angiosperms (Ex. 5.2, p. 92)
2. Vegetative Reproduction: Regeneration, Plant (Ex. 15.4, p. 284)

Thrasher, Frank P. Exercises for Biological Principles in Agricultural Crops. San Luis Obispo, California: Vocational Education Productions, California State Polytechnic College, 1968.

3. Measurement of Growth in Stems (Ex. 14, p. 39)
4. Root Growth (Ex. 15, p. 41)
5. Cleft Grafting (Ex. 19, p. 51)
6. Root Cuttings (Ex. 21, p. 55)
7. Light Exercise (Ex. 1, p. 5)
8. Moisture (Ex. 2, p. 7)
9. Temperature (Ex. 3, p. 9)

Carter, Dr. Logan S. Experiments in Soil Science. San Luis Obispo, California: California State Polytechnic College, 1968.

10. Soil Texture (Ex. 5, p. 17)
11. How to Make a Miniature Soil Profile (Ex. 9, p. 39)
12. Soils are Different (Ex. 10, p. 45)

EXPERIMENTS (Continued)

13. Soil Moisture (Ex. 13, p. 57)
14. Infiltration Rates of Soils (Ex. 14, p. 63)
15. Operation of Tensiometers (Ex. 19, p. 77)
16. Measuring Acidity and Alkalinity (Ex. 27, p. 125)
17. Saline and Alkaline Soils (Ex. 28, p. 131)
18. Sources of Nutrients (Ex. 29, p. 133)

Carlock, John R. and Moore, Harold A. The Laboratory--The Spectrum of Life. New York: Harper and Row, 1970.

19. Portrait of a Plant (Ex. 21, p. 177)
20. The Higher Plant--Basic Design of Organs (Ex. 22, p. 187)

Pramer, David. A Laboratory Block, Life in the Soil. Boston: D. C. Heath and Company, 1965.

21. Soil Organisms (Ex. 3, p. 19)

Lasser, Milton S. Life Science. New York: Amsco School Publications Inc., 1967.

22. Producing More Potatoes (Ex. 21, p. 195)
23. Vegetative Reproduction (Ex. 21, p. 199)

PROJECTS

1. Obtain copies of various soil maps from the U. S. and/or Florida Department of Agriculture and make a survey of different types of soils found in South Florida and more particularly Dade County. Attempt to describe which soils are best for growing particular vegetable crops.

2. Collect several soil samples from various parts of the county. Weigh 100 grams of each and place in small containers such as Dixie cups. Add exactly the same amount of distilled water to each sample to obtain a "soupy" texture. Place a small piece of pH paper into the mixture and record the results in a notebook. Use at least a minimum of 25 samples. Do the pH readings change in different parts of the county? If so, why?

PROJECTS (Continued)

3. Develop a study of rainfall distribution in South Florida by using data from the U. S. Weather Bureau and the local newspapers. How does the South Florida Flood Control District attempt to "balance" the yearly rainfall? Locate the flood control conservation areas and drainage canals on a map. What differences should you expect if there were no conservation areas or irrigation and drainage canals?

4. Make a survey of several "outlets" for commercial fertilizers, and accumulate records as to the substances in each of the great variety of fertilizers. Find references as to what each of the three major components of the fertilizers does toward the total growth of a typical plant. Add to this research a sampling of plants that require different concentrations of chemicals for particular maximum growth and production rate.

5. Grow 12 or 15 seedlings to about 3 to 5 inches. Place these in three groups. Apply ½ cup of 6,6,6 fertilizer around each seedling, approximately ½ inch from the base of the stem. Do not water group one at all. Add ½ cup of the same fertilizer to the second group and water moderately until the ground is continually damp. Repeat this test with group three and flood the plants each day. Record the results on a long term graph and attempt to find the optimum growth rate over a period of three or four weeks.

6. Collect at least five different flowers that will produce or have produced seeds and/or fruit. Review the types of reproduction and seed production capacity of a variety of flowers. Attempt to tell if each flower is a pistillate or staminate flower.

7. Make a study of edible fruits and vegetables. Taking at least thirty such examples, determine if the food comes from the flower, stem, or root. Determine which part of the plant is the major food producer.

8. Read information on different types of grafting and/or visit a nursery if a demonstration can be arranged. Make a series of sketches of the different types of grafting. Attempt a graft on a plant such as a rose or fruit tree. Also, produce a new plant by "air-layering."

9. Construct a nematode trap, learning the techniques for collecting and counting these worms. Study their typical life cycle, methods of obtaining food from vegetation and the resulting damage. What are some of the methods of control for this economically serious pest?

10. Visit a branch office of the Department of Agriculture, Seventh Avenue and 27th Street, Miami, Florida. Survey some of the many programs they support. They offer many brochures. Collect any brochures that may interest you.

PROJECTS (Continued)

11. Make a study of the deaths of people in the U. S. resulting from misuse of pesticides in agriculture. What are some safeguards employed by people who continually use these poisons?

12. Read selected portions of Rachael Carson's Silent Spring and summarize the effects of various pesticides used in agriculture in the U. S. List and describe the various side effects to other plant and animal life and attempt to explain how each upsets the ecological balance of an established area.

13. Diagram and explain how a plant is able to take water into its system. Study the terms of osmosis and diffusion. Relate how these apply to the water intake process.

14. Diagram and explain how ground water in soil is a result of several physical factors including adhesion, cohesion, hydrostatic forces and capillarity. Explain the importance of the water table in agriculture and how the water table may vary with poor irrigation practices.

DISCUSSION QUESTIONS AND REPORTS

1. What are the basic ingredients in a typical soil? How may these various substances be catagorized to classify a particular soil type?

2. What is meant by "zones of leeching"? Soil horizons?

3. How does the level of the ground water table influence growth rate and abundance of vegetation endemic to that region?

4. Erosion of soil is a serious problem in the basic environment, particularly with reforestation problems and certain kinds of agriculture. What are some positive soil management techniques that make this problem less serious?

5. What is meant by "annual rainfall"? What are some of the local and statewide environmental conditions that determine the amounts and distribution of rainfall?

6. If a person overfertilized a plant but gave it sufficient water, it is likely to die. What is the basic reason for the dehydration of that particular plant?

DISCUSSION QUESTIONS AND REPORTS (Continued)

7. What are some of the components of fertilizers? What do the various groups of three numbers actually mean with relation to nutrient requirements?

8. What are some of the reasons that plants can grow in certain areas and not in others? What are some of the specific limits of the environment that restrict distribution and growth?

9. What are the different parts of a typical seed and what is the function of each part?

10. Discuss some of the specific differences between the seed and the growing sprout of monocots and dicots.

11. Why will seeds germinate in a warm environment and actually grow for some time in the absence of light? Why would they eventually die without sunlight?

12. What are the various parts of a typical flower? What function would each part have toward the entire flower? What is the difference between an incomplete and a complete flower? A staminate and a pistillate flower?

13. What are the substances that produce the color in many flowers? Why do you think flowers have colored petals?

14. Why are fruits and vegetables classed as such? What are some of the more prominent foods from plants and what part of the plant do they come from?

15. Seed pods assume many different forms. What are some of the unusual types of seed pods and how does seed dispersal occur?

16. Describe or sketch various methods by which plant grafting is accomplished. What would the benefits be for each particular type of grafting?

17. The citrus industry could never exist without the practice of grafting certain type branches and budding areas to a particular type stock. What are some of the problems that make this practice necessary?

18. Compare basic mouth parts of several different insect types. How is each adapted for the insect to take food? What are some of the more economically destructive insects in agriculture? How, specifically, do they cause a problem?

DISCUSSION QUESTIONS AND REPORTS (Continued)

19. Life cycles of insects vary. Relate some of these cycles and the portion or portions of each cycle to actual agriculture damage.

20. It seems necessary to continually increase the strength and distribution of pesticides. How can the use of pesticides, even with careful control, disrupt our normal environment?

21. What are some of the eradication methods used against infestation of agricultural crops, particularly for an epidemic or invasion from other areas?

22. Why is it necessary at times to quarantine plants, not allowing them to be transported from state to state? Why, occasionally, is there an embargo placed on citrus shipments from Florida?

23. What are some of the projects students are doing at the school agriculture farm? What are some of the problems a student encounters if he is raising plants to sell commercially?

24. The migrant labor force is a great social and economic problem. What are some of the specific problems for the local government and more important, to the migrant individuals?

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER

1. Acid-Base Indicators
   1-10799, 19', C, JS

2. Climate and the World We Live In
   1-11007, 14', C, EJ

3. Conserving our Water Resource Today
   1-00426, 11', C

4. Conserving our Forests Today
   1-03767, 11', C

5. Adaptations in Plants
   1-11107, 13', C, EJ

6. Adventures in Conservation
   1-10218, 13', C, EJS

7. Alaska's Modern Agriculture
   1-12313, 15', C, JS

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER (Continued)

8. Corn Farmer
I-11490, 17', C, EJS

9. Dairy Industry
I-03893, 11', B/W, EJS

10. Insect Collecting
I-11155, 14', C, EJS

11. Insect Enemies and Their Control
I-02765, 11', C, EJS

12. Insect Life Cycle
I-02787, 11', B/W, JS

13. Leaves
I-02262, 10', B/W, EJS

14. Microscope, The
I-02241, 11', C, S

15. Mountain Waters
I-11439, 16', C, EJS

16. Origin of Weather
I-30376, 26', C, EJS

17. Our Natural Resources
I-00417, 10', C, EJS

18. Plant Reproduction
I-30649, 28', C and B/W, S

19. Realm of the Wild
I-30686, 30', C, EJS

20. Regulation of Growth
I-30469, 28', C and B/W, S

21. Roots of Plants
I-02320, 11', C, EJS

22. Seed Dispersal
I-02293, 11', B/W, JS

23. Story of Sugar
I-04063, 11', B/W, EJ

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER (Continued)

24. Story of Soil, The
1-03718, 11', B/W, JS

25. Water and the Land
1-03587, 11', C, EJS

26. Careers in Agriculture
1-10327, 14', C, JS

FILM STRIPS

1. Introduction to the Microscope
A448-1 SVE Films

2. Acid-Base Theories
636, FOM Filmstrip of the Month Club

3. Hormone Control of Insect Development
1571, Popular Science Audio-Visual Inc.

4. The World of Insects: Insects that Destroy Plants
Eye-Gate House, Inc.

5. The World of Insects: Household Pests
Eye-Gate Films

6. The World of Insects: The Mosquito
Eye-Gate Films

7. The World of Insects: Some Useful Insects
Eye-Gate House.

8. Fundamentals of Geography: Air and Weather
Eye-Gate House

9. Fundamentals of Geography: Violent Forces of Nature
Eye-Gate House.

10. Understanding Weather Conditions
Popular Science A/V Publications

11. Solar Radiations
681, Popular Science A/V Publications

12. Life in the Soil
1549, FOM Filmstrip of the Month Club

FILM STRIPS (Continued)

13. Methods of Identifying Trees
FOM Filmstrip of the Month Club

14. Structure of Flower Plants
A465-2, SVE Films

15. What Makes Up a Flower Family
A465-1, SVE Films

16. Forest Fires
A429-9, SVE Films

17. Aiding Wildlife of Field and Stream
A429-7, SVE Films

18. How Man Destroys Soil
A429-2, SVE Films

19. Controlling Erosion in Fields and Woods
A429-3, SVE Films

20. How Hormones Regulate Plant Growth
171726, McGraw Hill Book-A Popular Science Filmstrip

21. Insects, Part VI
LIFE Filmstrip

22. Plant Factories
A427-12, Harper and Row

23. The Life Cycle of Rivers
FOM Filmstrip of the Month Club

GUEST SPEAKERS AND FIELD TRIPS

1. Department of Agriculture
   2690 N. W. 7th Avenue
   Miami, Florida - or -

   1102 N. Krome Avenue
   Homestead, Florida

2. Extension Forester
   Division of Forestry
   6531 State Road 84
   Fort Lauderdale, Florida 33314

3. School Agriculture Farms

4. Florida Tropical Experiment Farm
   Punta Gorda
   Speakers on request

5. Customs Agencies
   Quarantine Laws

6. Garden Club Lecturers

7. Agricultural Research and Education Center
   (Formerly the Sub-Tropical Experimental Station)
   Homestead, Florida

8. Extermination Companies

9. Local Nurseries

10. Citrus Growers

REFERENCES

1. Biological Sciences Curriculum Study. Biological Science. BSCS Green Version Laboratory and Field Investigations. Chicago: Rand McNally and Company, 1963.

2. Biological Sciences Curriculum Study. Biological Science: An Inquiry into Life. 2nd ed. New York: Harcourt, Brace and World, 1968.

3. Biological Sciences Curriculum Study. Biological Science: Molecules to Man. 2nd ed. Boston: Houghton Mifflin Company, 1968.

4. Biological Sciences Curriculum Study. High School Biology. 2nd ed. Chicago: Rand McNally and Company, 1968.

5. Brandwein, Beck, Strahler, Brennan, and Turner. The Earth, It's Living Things. New York: Harcourt, Brace, Javanovich, Inc., 1970.

6. Careers in Agriculture. Gainesville, Fla.: College of Agriculture Bulletin, University of Florida, 1967.

7. Carlock, John R. and Moore, Harold A. In the Laboratory, the Spectrum of Life. New York: Harper and Row, 1970.

8. Carson, Rachael. Silent Spring. Greenwich, Connecticut: Fawcett Publications, Inc., 1967.

9. Carter, Logan S. Experiments in Soil Science. San Luis Obispo, Cal.: California State Polytechnic College, 1968.

10. DeWaard, John E. What Insect is That? Middletown, Connecticut: American Education Publications, 1969.

11. Dishington, Arthur C., Editor. Cultivator. Special Fertilizer Issue. Coral Gables, Florida.

12. Dishington, Arthur C., Editor. Cultivator, Vol. 5, No. 2, Special Pesticide Issue. Coral Gables, Florida.

13. Higbee, Edward. Farms and Farmers in an Urban Age. New York: The Twentieth Century Fund, 1963.

14. Jaques, H. E. How to Know the Insects. Debuque, Iowa: Wm. C. Brown Company, 1947.

15. Kains, M. G. and McQuesten, L. M. Propagation of Plants. New York: Orange Judd Publishing Company, Inc., 1954.

REFERENCES (Continued)

16. Land, The Yearbook of Agriculture. Washington, D.C.: The U. S. Department of Agriculture, 1958.

17. Maxon, John M. and Peters, Ruth T Life Science, A Modern Course. Princeton, New Jersey: Van Nostrand Company, Inc., 1970

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19. Maxwell, Lewis S. Florida Fruit. Tampa, Florida: Lewis Maxwell Publications, 1967.

20. Maxwell, Lewis S. Florida Insects: Their Habit and Control. Tampa, Florida: Lewis S. Maxwell Publications, 1965.

21. Maxwell, Lewis S. Florida Plant Selector. Tampa, Florida: Lewis Maxwell Publications, 1968.

22. Odum, Eugene P. Fundamentals of Ecology. Philadelphia and London: W. B. Saunders Company, 1961.

23. Phillips, Edwin. Field Ecology. A Laboratory Block. Boston: D. C. Heath and Company, 1965.

24. Pramer, David. Life in the Soil. A Laboratory Block. Boston: D. C. Heath and Company, 1964.

25. Rather, Howard C. Field Crops. New York: McGraw Hill Book Company, Inc., 1942.

26. Smith, Leighty, Caldwell, Carlisle, Thompson, Mathews. Principal Soil Areas of Florida. Gainesville, Florida: Florida Agricultural Experimental Station, USDA Bulletin Number 717, University of Florida, 1967.

27. Strohm, John and Ganschow, Cliff, ed. The Ford Almanac. New York: Golden Press, 1969.

28. Thrasher, Frank P. Exercises for Biological Principles in Agricultural Crops. San Luis Obispo, California: California State Polytechnic College, 1968.

29. Ware and McCommum. Raising Vegetables. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1959.

30. Watkins, John V. Plant Propagation for Florida Homes. Tallahassee: State of Florida Department of Agriculture, 1957.

REFERENCES (Continued)

31. Watkins, John V. and Parvin, Philip E. Flowers for Florida Homes. Tallahassee: State of Florida Department of Agriculture, Bulletin 59, 1957.

32. Went, Frits W. The Plants. New York: Time Inc., Book Division of Life Magazine, 1963.

MATERIALS LIST

1. 10 copies BSCS Green Version Laboratory Manual. Chicago: Rand McNally and Company, 1964.
2. One rain gauge.
3. Ten thermometers, medium range.
4. Ten rolls pH paper, 2-11 range.
5. Weather maps, class set, U. S. Department of Commerce Weather Bureau, Immediate U. S. Weather Report.
6. Aneroid barometer.
7. Dew Point apparatus.
8. Triple beam balances, 6.
9. Filter paper, variety.
10. Soil types and distribution maps, Florida Department of Agriculture.
11. Charts of reforestation techniques, pulp and paper companies.
12. Sudbury Soil Testing Kit.
13. 5 copies - Thrasher, Frank P. Exercises for Biological Principles in Agricultural Crops. Vocational Education Productions, California State Polytechnic College, San Lius Obispo, California, 1968.
14. Portable pH meter, if available.
15. Available seeds for coleoptile growth, 10 flats.

MATERIALS LIST (Continued)

16. Variety of fertilizers, various element concentrations.

17. 1 copy - Phipps, Lloyd J. Handbook on Agricultural Education in Public Schools. The Interstate Printers and Publishers, Inc. Danville, Illinois, 1965.

18. Copies, when available of The Yearbook of Agriculture. The U. S. Government Printing Office, Washington, D. C. Yearly copies.

19. 5 copies - Higbee, Edward. Farms and Farmers in an Urban Age. New York: The Twentieth Century Fund, 1963.

20. 5 copies - Kains, M. G. and McQuesten, L. Propagation of Plants. New York: Orange Judd Publishing Company, Inc., 1954.

21. 5 copies - Went, Fritz W. and Editors of Life. Life Nature Library. Time Inc., New York, 1963.

22. 5 copies - Cochrane, Willard W. The City Man's Guide to the Farm Problem. St. Paul: North Central Publishing Company, 1965.

23. 5 copies - Smith, Guy, Harold, Editor. Conservation of Natural Resources. New York: John Wiley and Sons, Inc., 1965.

24. Landsberg, Hans H.; Fischman, Leonard L.; and Fisher, Joseph L. Resources in Americas Future. John Hopkins Press, Baltimore, Maryland, 1963.

25. DeWaard, John. What Insect in That? An American Education Publication, 55 High Street, Middleton, Connecticut, 1969.

26. 3 copies - Fitzpatrick, Frederick L. Our Plant Resources. Holt, Rinehart and Winston, New York, 1964.

MASTER SHEET--AGRICULTURAL BIOLOGY

Objectives	Readings	Experiments	Films	Film Strips	Reports/Discussion Questions	Projects
1	#17. pp. 328-334 #9. pp. 15-76 #26. pp. 5-64 #4. pp. 230-248	4,11,14,17	1,14,24	2,12,18	1,2,3,4	1,2
2	#9. pp. 125-144 #4. pp. 230-248	17,18,19	20,1,24	2,8,12,16,18	1,2,3,4,6,7	1,2
3	#28. pp. 29-30 #2. pp. 677-686	9,10,14	2,3,15,25	10,11,19,23	2,5,6,11	2,3
4	#9. pp. 165-200 #4. pp. 8-11	17,18,19	1,20,24	2,3,18	6,7,8	4,5
5	#17. pp. 104-116 #28. pp. 29-30 #2. pp. 254-278	2,3,24	5,18,20,22	1,2,15,20,22	3,8,10,11	5
6	#17. pp. 104-116 #2. pp. 254-278 #4. pp. 159-166	1,2,21	15,18,20	13,20,22	9,10,11,12,13,14	6,7
7	#17. pp. 104-116 #4. pp. 159-166	1,2	18,21,22	14,15	12,13,14,15	61,7
8	#17. pp. 233-239 #28. pp. 49-59 #15. pp. 264-396	2,5,7,24	13,18	20	16,17	8
9	#17. pp. 343-346 #10. pp. 4-61	22	10,11,12,15	3,4,5,6,7,12,21	18,19,20,21,22	9,11
10	#17. pp. 343-350 #20. pp. 1-115		10,11,12	3,4,5,6,10	18,19,20,21,22	10,11,12
11	#18. pp. 4-117 #31. pp. 4-117 #21. pp. 1-104 #19. pp. 4-120		1,5,18,20,22	10,14,15,20	8,11,14,22	13,14
12	#13. pp. 7-143		4,6,7,8,9,17,19,23,25,26	4,10,12,13,16,18,19,20,22,23	20,21,22,23,24	10,12,13